REMARKS

Claims 43-59 are pending in this application. By this Amendment, claims 1-42 are canceled, and claims 43-59 are added. Applicants reserve the right to file one or more divisional applications to pursue the non-elected claims. No new matter is added by this Amendment. Support for the new claims is found at, for example, page 18-23 of the specification.

I. Rejections Under 35 U.S.C. §102(a), §102(b) and §103(a)

Claims 1-5, 7-19 and 39-42 are rejected under 35 U.S.C. §102(a) and §102(b) over U.S. Publication No. 2003/0030689 A1 (Hashimoto) or U.S. Patent No. 5,132,248 (Drummond); claims 13-19 are rejected under 35 U.S.C. §103(a) over Hashimoto or Drummond in view of U.S. Patent No. 4,492,966 (Seki); claim 11 is rejected under 35 U.S.C. §103(a) over Hashimoto or Drummond as applied to claim 1 above, and further in view of JP 401007349 A; and claims 2-4 and 40-42 are rejected under 35 U.S.C. §103(a) over Hashimoto or Drummond as applied to claim 1 above, and further in view of EP 1357772 A2. These rejections are respectfully traversed.

Claims 1-5, 7-19 and 39-42 are herein canceled. Thus, these rejections are moot.

In addition, new claims 43-59 are not anticipated or rendered obvious by the applied references of record.

In particular, none of the cited references disclose "a first step of ejecting a plurality of first droplets containing a functional material from a nozzle of a first head, and disposing the first droplets on a fixing surface of the substrate at intervals at which the first droplets do not come into contact with each other; a second step of, after the first step, irradiating each of the first droplets disposed on the fixing surface with a first laser beam; [and] a third step of, after the second step, disposing a second droplet containing the functional material between the first droplets," as recited in claim 43.

According to the above-recited features, if a plurality of droplets is applied so as to form a continuous pattern, the continuum of the droplets is deformed so as to assume the shape close to that of a sphere under the effect of surface tension, and local migration occurs. Because the droplets are applied so that they are separated from each other, each droplet remains in the application position. See page 18, lines 8 to 14 of the specification.

Furthermore, as shown in Fig. 2, and according to the above-recited features of claim 43, the substrate carriage 130 transports the substrate 132 so that the droplets ejected from the ejection head 120 fall so as to fill the gaps between the droplets that were applied by the first scanning. As a result of such impacts, the newly applied droplets are brought in partial contact with the droplets that were applied in the first scanning cycle, but the droplets applied in the first scanning cycle have been dried by the laser beam. Therefore, the newly applied droplets are not fused with the droplets applied in the first scanning cycle and local migration thereof is prevented. See page 20, lines 1 to 8 of the specification.

Furthermore, with reference to Fig. 3, and according to the above-recited features of claim 43, with the apparatus 100 for fixing a functional material, the droplets are dried by irradiating the droplets with a laser beam immediately after the application. As a result, any fine silver particles contained in the droplets can be dried and fixed to the substrate 132, without causing the displacement from the application position. With the method for fixing a functional material as claimed, the applied droplets are forcibly dried with a laser beam. Therefore, the treatment time can be significantly shortened in comparison to the conventional patterning technology in which a process of applying the droplets and a process of naturally drying the applied droplets are repeatedly conducted in combination. See page 21, lines 10 to 19 of the specification.

None of the cited references of record discloses the features of claim 43, or the benefits associated therewith, as discussed above.

Also, none of the cited references discloses "a first step of ejecting a first droplet containing a functional material from a nozzle of a first head to dispose the first droplet on a fixing surface of the substrate; a second step of, after the first step, irradiating the first droplet disposed on the fixing surface with a first laser beam; and a third step of, after the second step, irradiating the first droplet with a second laser beam having an intensity greater than that of the first laser beam to fire the first droplet, forming a conductive film containing the functional material," as recited in claim 45.

According to the steps recited in claim 45, and with reference to Fig. 3, the droplets that are thus applied are transported together with the droplets (group 134 of fine silver particles) that were dried in the previous scanning cycles toward the focusing position P1 of the laser beam. The laser beam source 140 irradiates the droplets that were newly applied and the group 134 of fine silver particles with a laser beam with a high-level intensity, the group 134 of fine silver particles is heated to a temperature of about 300 °C, and the group 134 of fine silver particles 134 is fired. The fine silver particles present in the group 134 of fine silver particles are sufficiently sintered and the electric conductivity of the group 134 of fine silver particles becomes sufficient for a wiring. Furthermore, only the portion of the substrate 132 where the group 134 of fine silver particles is present is locally heated by irradiation with a laser beam. Therefore, substantially no thermal expansion occurs in the substrate 132 and the probability of alignment loss or wiring breakdown is reduced. Moreover, only the group 134 of fine silver particles, rather than the entire substrate 132, is locally heated. Therefore, the consumption of energy can be greatly decreased by comparison with the method by which the particles are heated together with the substrate 132. See page 21, lines 1 to 9 and page 22, lines 12 to 20 of the specification.

None of the cited references of record discloses the features of claim 45, or the benefits associated thereof, as discussed above.

Also, none of the cited references disclose "a reflector that applies a laser beam emitted from the laser beam source to a location of impact of the droplet ejected from the nozzle," as recited in claim 55. With such a reflector, as shown in Fig. 4, the apparatus 200 fixes a functional material. In the device 200, a reflector 180 is additionally provided in the optical path of laser beam in the structure of the apparatus 100 for fixing a functional material. The reflector 180 reflects the laser beam emitted from the laser beam source 140 so as to focus it on the impact position P2 of the droplets ejected from the ejection head 120 onto the upper surface of the substrate 132. If, for example, the substrate 132 is practically not scanned within a period from the ejection of the droplet from the ejection head 120 to its impact with the substrate, then the reflector 180 will focus the laser beam on the point directly below a nozzle 126 provided at the ejection head 120, on the upper surface of the substrate 132. See page 23, lines 7 to 17 of the specification.

None of the cited references of record disclose the features of claim 55, or the benefits associated thereof, as discussed above.

For the foregoing reasons claims 43, 45 and 55, as well as the claims depending therefrom, are not anticipated or rendered obvious by the applied art of record.

II. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of pending claims are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

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